**First name and last name** _____ **Student number** _____

*Fill out with capital letters*

*Writing time: 75 minutes, date:* Februay 18, 2020

Comments: in case of all programs assume that libraries iostrem and stdlib are attached and the namespace std is available. Only places marked for the answers are graded. In case you find a mistake or ambiguity in a question, please write an appropriate comment which explains that. The number of marks fo the test is 0-100 points (passing threshold = 50%).

**Question 1. (21 pts. = 3*7 pts.)**

Fill out the gaps so that the program prints on the screen:

**121**

Do not use the following characters in your answers: ;,=()

```
int f( void ) {

     static int      x;

  cout << x++    + 1    ;

  return x;
}
int main() {
   f();
   cout << f()    - 1  ;
   return 0;
}
```

---

**Question 2. (21 pts. = 3*7 pts.)**

What numbers will be retured by the following function calls: f(12), f(11) and f(0)?

Answer:

f(12) = **12**

f(11) = **11**

f(0) = **12**

```
int f( int a ) {
   if ( a % 4 || a / 2 < a - 5)
      return a;
   else
      return f( a + 4 );
}
```

---

**Question 3. (18 pts. = 3*6 pts.)**

What is printed to the screen as a result of executing the three instructions `*cout*'?

Answer:

`*cout*' no 1: **1**

`*cout*' no 2: **2**

`*cout*' no 3: **4**

```
typedef struct {
   int a;
} A_t;
A_t a[2];
void w( A_t x ) { ++(x.a); }
A_t *y( A_t *x ) { ++(x->a); return x; }
int main() {
   a[0].a = 1;
   w( a[0] );
   cout << a[0].a; // `cout' no 1
   y( a );
   cout << a[0].a; // `cout' no 2
   y( y( a ) );
   cout << a[0].a; // `cout' no 3
   return 0;
}
```

---

**Question 4. (20 pts. = 4*5 pts.)**
Give the text that is written to the screen as a result of executing the subsequent instructions *cout* (in place for an answer marked with label "Instruction x:" write the text that is printed to the screen by instruction *cout* makred with comment /* I-x */. Write *ERR* if the answer cannot be uniquely determined. Binary encoding of number is assumed, as presented during the lectures, i.e., U2. If some instruction results in an execution error, then also write ERR as an answer and continue your analysis by skipping this instruction. Assume that the call to *malloc* returns value different than *NULL*.

```
int main() {
   int *p = (int *) malloc( 10*sizeof(int) );
   int t[10], g = 4, *b = &(p[7]);
   char s[] = {"Napisy"};

   cout << (int)sizeof( p )-(int)sizeof( t ); /* I-1 */

   cout << ( (sizeof(s) ) ^ 15 ); /* I-2 */

   cout << g + (g++); /* I-3 */

   cout << (p-b)/sizeof(int); /* I-4 */
   return 0;
}
```

Odpowiedzi:

Instruction 1: **ERR**

Instruction 2: **8**

Instruction 3: **ERR**

Instruction 4: **ERR**

---

**Question 5. (20 pts. = 2*10 pts.)**
Fill out the gaps so that the program compiles successfully, executes without errors and prints to the screen:

**Exam**

```
void f( char *p ) {

 while ( *(    p+2   ) != 'a' ) {

    p++    ;
 }
 cout << p;
}
int main() {
   char str[] = { "SecondExam" };
   f( str );
   return 0;
}
```